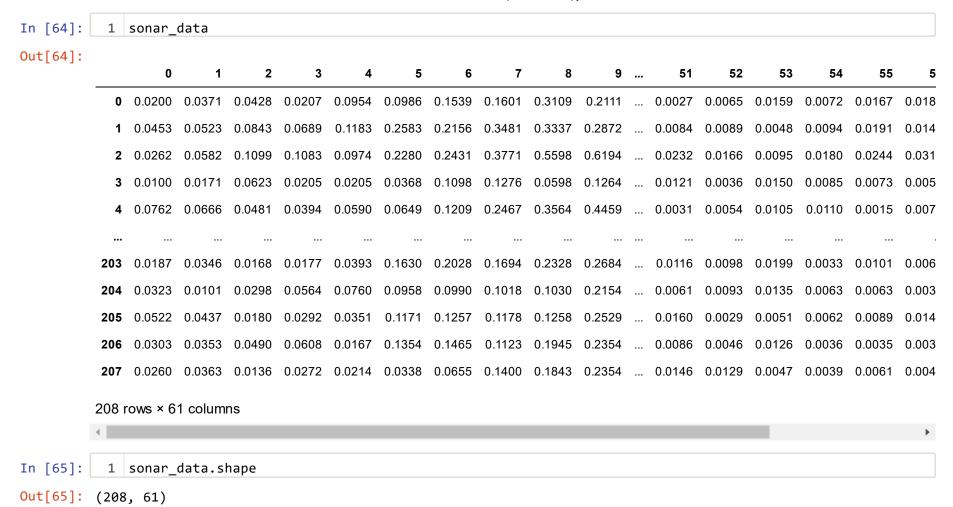
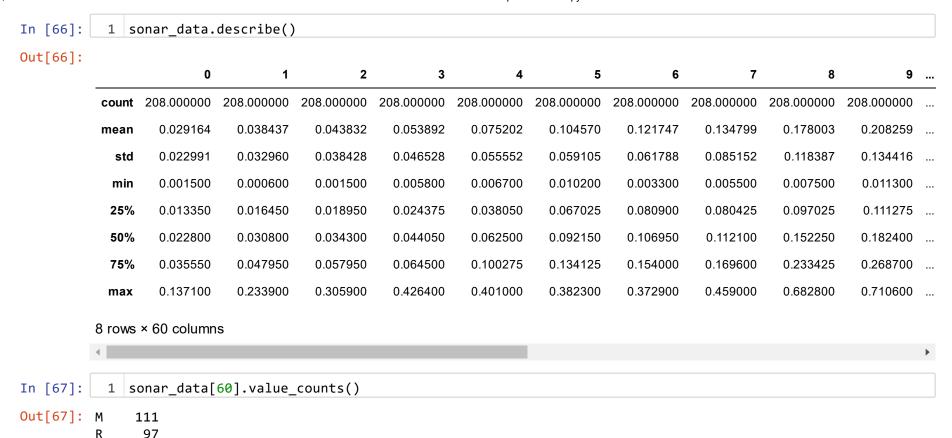
Importing Dependencies

```
In [62]: 1 import numpy as np
    import pandas as pd
    import matplotlib.pyplot as plt
    from sklearn.model_selection import train_test_split
    from sklearn.linear_model import LogisticRegression
    from sklearn.metrics import accuracy_score
```

Data collection and processing

```
In [63]: 1 # Loading the dataset
2 sonar_data = pd.read_csv('sonar data.csv', header=None)
```





M ---> Mine

Name: 60, dtype: int64

R ---> Rock

```
1 sonar_data.groupby(60).mean()
In [68]:
Out[68]:
                     0
                               1
                                        2
                                                 3
                                                                                     7
                                                                                                       9 ...
                                                                                                                  50
                                                                                                                            51
           60
            \mathbf{M} 0.034989 0.045544 0.050720 0.064768 0.086715 0.111864 0.128359 0.149832 0.213492 0.251022 ... 0.019352 0.016014 0.09 \mathbf{M}
            R 0.022498 0.030303 0.035951 0.041447 0.062028 0.096224 0.114180 0.117596 0.137392 0.159325 ... 0.012311 0.010453 0.00
           2 rows × 60 columns
In [69]:
            1 # separating data and label
            2 x = sonar_data.drop(columns = 60, axis = 1)
            3 y = sonar_data[60]
```

In [70]: 1 x, y

```
Out[70]:
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                 0.0036
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                                   0.0115
           [208 rows x 60 columns],
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           2
                   R
```

```
3 R
4 R
...
203 M
204 M
205 M
206 M
207 M
Name: 60, Length: 208, dtype: object)
```

Training and Test data

Model Training ----> LogisticRegression

```
In [86]: 1 model = LogisticRegression()
```

In [88]: 1 x_train, y_train

```
Out[88]: (
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                                   0.0071
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           56
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           203
           [187 rows x 60 columns],
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           56
```

```
123
                 Μ
          18
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          5
          154
                 Μ
          131
                 Μ
          203
                 Μ
          Name: 60, Length: 187, dtype: object)
In [89]:
           1 # training the LOgistic Regression model with training data
           2 model.fit(x train, y train)
Out[89]: LogisticRegression()
```

Model Evaluation

Making a predictive system

Accuracy on training data: 0.7619047619047619

```
In [96]:
           1 input data = (
           2 0.0192,0.0607,0.0378,0.0774,0.1388,0.0809,0.0568,0.0219,0.1037,0.1186,0.1237,0.1601,0.3520,0.4479,0.3
           3
             # change the input data to numpy array
             input data as numpy array = np.asarray(input data)
           7 # reshape the np array as we are predicting for one instance
             input data reshape = input data as numpy array.reshape(1, -1)
          10
          11 | prediction = model.predict(input data reshape)
          12 prediction
          13
          14 if (prediction[0] == 'R'):
                 print('The object is a Rock')
          15
          16 else:
                 print('The object is a mine')
          17
```

The object is a Rock

```
In [97]:
           1 input data = (0.0260,0.0363,0.0136,0.0272,0.0214,0.0338,0.0655,0.1400,0.1843,0.2354,0.2720,0.2442,0.1
           2 # change the input data to numpy array
           3 input data as numpy array = np.asarray(input data)
             # reshape the np array as we are predicting for one instance
             input data reshape = input data as numpy array.reshape(1, -1)
           7
             prediction = model.predict(input data reshape)
          10 prediction
          11
          12 if (prediction[0] == 'R'):
          13
                 print('The object is a Rock')
          14 else:
                 print('The object is a mine')
          15
```

The object is a mine

In []: 1